

## **Demographic Change, Relative Factor Prices, International Capital Flows, and Their Differential Effects on the Welfare of Generations**

ALEXANDER LUDWIG, DIRK KRÜGER, AND AXEL BÖRSCH-SUPAN

While the size, rate of growth and age distribution of the population is changing worldwide, the magnitude of demographic changes, and the timing and character of those changes differ significantly across countries, and across regions of the world. There is variation in aggregate population growth rates and trends; variation in the ratio of the working-age population to the total adult population; and variation in the portion of the population at older ages. These demographic variations, and the varying paths of demographic change over time, affect international flows of capital and other resources. And these flows, in conjunction with the demographic changes themselves, affect the macroeconomic characteristics of different countries, and the welfare of different generations within them.

This study focuses on the complex relationships and dynamic interactions between demographic trends, international resource flows and macroeconomic changes across countries. For instance, what are the effects of these long-run developments on relative factor prices and welfare? And what are the additional effects of ongoing pension reforms that convert the pay-as-you-go (PAYGO) pension systems into multi-pillar systems with potentially large capital stocks?

The intuitive relationships can be summarized as follows. First, changes in the population structure will alter aggregate labor supply and aggregate savings which, in turn, alters the prices for labor and capital. As the working age population declines, for example, labor will become scarcer, relative to capital, real wages will increase and real rates of return to capital will decrease. Second, as countries reform their PAYGO pension systems, the additional supply of capital from those reforms reinforces the downward pressure on the rate of return to capital. The welfare implications of changing factor prices differ across generations, as younger generations gain from wage increases, and older generations lose from lower capital returns.

Our goal in this project is to quantifying these effects in an international context, accounting for international flows of resources across countries. Much of our work to date has been in developing an economic model to make these calculations.

The study finds that the rate of return to capital decreases by roughly 80 to 90 basis points if capital is allowed to flow freely across regions. The simulations indicate that capital flows from rapidly aging regions to the rest of the world will initially be substantial, but that trends are reversed subsequently. However, because long-term demographic trends are highly correlated across OECD countries, the capital flows across countries do not affect much the long-run decrease in the rate of return on capital. In other words, the impact of open markets in moderating the macroeconomic impact of demographic change within countries is less important, because of the similarities in demographic change across countries in the long-term.

---

In terms of the generational welfare effects, the simulations suggest that for younger households with few capital assets, increases in wages will dominate the decline in rates of return on capital. For example, abstracting from social security and its reform, the cohort born in 2005 will gain about 0.6-0.9 percent in terms of lifetime consumption. Older, asset-rich individuals, on the other hand, tend to lose because of the decline in interest rates on capital. However, if demographic changes necessitate reforms in social security, then reduced benefits or increased taxes will moderate the welfare gains to the younger generation.

The full working paper is available on our website [www.nber.org/programs/ag/rrc/books&papers.html](http://www.nber.org/programs/ag/rrc/books&papers.html) as paper NB06-11.

ALEXANDER LUDWIG is an Assistant Professor at the Mannheim Research Institute for the Economics of Aging at the University of Mannheim (Germany).

DIRK KRUEGER is an Associate Professor of Economics at the University of Pennsylvania and an NBER Faculty Research Fellow.

AXEL BÖRSCH-SUPAN is the Director of the Institute of Economics and Statistics, University of Mannheim and an NBER Research Associate.

---

This research was supported by the U.S. Social Security Administration through grant #10-P-98363-3 to the National Bureau of Economic Research as part of the SSA Retirement Research Consortium. The findings and conclusions expressed are solely those of the author(s) and do not represent the views of SSA, any agency of the Federal Government, or the NBER.